



Ready-to-Use

STD Curriculum for Clinical Educators

Vaginitis Module

Target Audience - Faculty in clinical education programs, including those programs that train advanced practice nurses, physician assistants, and physicians

Contents - The following resources are provided in this module:

- **Faculty Notes** (Microsoft Word and Adobe Acrobat formats) - Includes notes that correspond to the slide presentation, a case study with discussion points, and test questions with answers
- **Slide Presentation** (Microsoft PowerPoint and Adobe Acrobat formats)
- **Student Handouts**
 - **Case Study** (Microsoft Word format)
 - **Test Questions** (Microsoft Word format)
 - **Slides Handout** (Adobe Acrobat format)
 - **Resources** (Microsoft Word format)

Suggested Time Allowance - The approximate time needed to present this module is 60-90 minutes.

These materials were developed by the Program and Training Branch, Division of STD Prevention, CDC. They are Based on the curriculum developed by the National Network of STD/HIV Prevention Training Centers (NNPTC) which includes recommendations from the 2010 CDC STD Treatment Guidelines

Information on the NNPTC can be accessed at:

www.nnptc.org

The 2010 CDC STD Treatment Guidelines can be accessed or ordered online at:

www.cdc.gov/std/treatment/2010



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[Slide 1]

Vaginitis

This module provides an overview of normal vaginal flora, common causes of vaginitis, and general information on the diagnosis and evaluation of vaginitis. The module covers

- Bacterial Vaginosis (BV)
- Vulvovaginal Candidiasis (VVC)
- Trichomoniasis

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Vaginal Environment

- The vagina is a dynamic ecosystem that normally contains approximately 10^9 bacterial colony-forming units per gram of vaginal fluid.
- The normal vaginal discharge is clear to white, odorless, and of high viscosity.
- The normal bacterial flora is dominated by lactobacilli, but a variety of other organisms, including some potential pathogens, are also present at lower levels.
- Lactobacilli convert glycogen to lactic acid.
- Lactic acid helps to maintain a normal acidic vaginal pH of 3.8 to 4.2.
- The acidic environment and other host immune factors inhibit the overgrowth of bacteria and other organisms with pathogenic potential.
- Some lactobacilli also produce hydrogen peroxide (H_2O_2), a potent microbicide that kills bacteria and viruses.

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Vaginitis

- Vaginitis can be characterized by any of the following—vaginal discharge, vulvar itching, vulvar irritation, vaginal odor, dyspareunia, and dysuria.
- The three most common types of vaginitis are—bacterial vaginosis (40%–45%), and vulvovaginal candidiasis (20%–25%), trichomoniasis (15%–20%). In some cases the etiology may be mixed, and there may be more than one disease present.

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Causes of Vaginitis

Causes of vaginal discharge or irritation may include

- Normal physiologic variation
- Allergic reactions, e.g., spermicides, deodorants
- Herpes Simplex Virus (HSV)
- Mucopurulent cervicitis—may be related to *Chlamydia trachomatis* or *Neisseria gonorrhoeae* infection
- Atrophic vaginitis—found in lactating and post-menopausal women and related to a lack of estrogen
- Vulvar vestibulitis, lichen simplex chronicus, and lichen sclerosis (especially pruritis)
- Foreign bodies, e.g., retained tampons
- Desquamative inflammatory vaginitis

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Diagnosis of Vaginitis

- Patient history
- Visual inspection of the external genitalia, vagina, and cervix
- Appearance of vaginal discharge: color, viscosity, adherence to vaginal walls, odor

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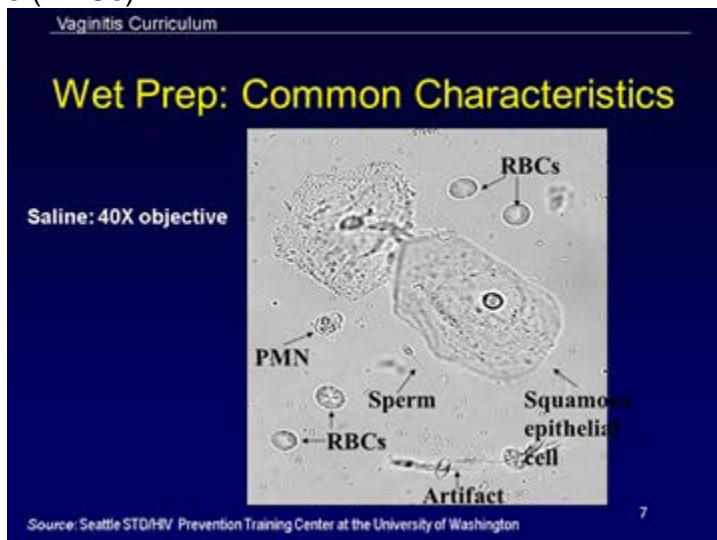
Preparation and Evaluation of Specimen

- Collect specimen—collect discharge from the lateral wall of the vagina with a swab
- Prepare specimen slide (wet mount)
 - With a drop of .9% warm saline and a drop of discharge; place cover slip on slide and examine microscopically at low and high power for clue cells and motile trichomonads.
 - Alternately—Place swab with discharge in 0.5 mL .9% warm saline; touch the swab to a slide and place cover slip on slide and examine microscopically at low and high power.
- In addition to wet mount, the following diagnostic steps can be helpful in the diagnosis of vaginitis.
 - KOH (wet mount)—microscopic examination of discharge for pseudohyphae or yeast with 10% KOH
 - Whiff test—assessment of a fishy odor after application of 10% KOH to wet mount
 - Vaginal pH—determine vaginal pH with narrow-range pH paper

[Slide 7]

Wet Prep: Common Characteristics

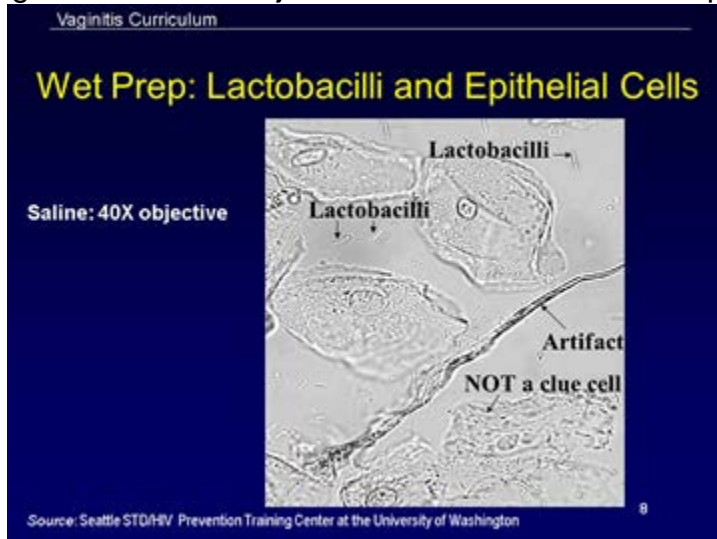
Image: Note squamous epithelial cell, polymorphonuclear (PMN) leukocyte, red blood cells (RBCs).



[Slide 8]

Wet Prep: Lactobacilli and Epithelial Cells

Image: Saline: 40x objective. Note lactobacilli and squamous epithelial cells.



[Slide 9]

Other Diagnostic Aids for Vaginitis Evaluation

- Culture—Available for both *T. vaginalis* and *Candida spp.* Culture may be useful in the management of persistent or recurrent vulvovaginal candidiasis. Culture for *T. vaginalis* is more sensitive than wet mount. Culture for bacterial vaginosis is not recommended.
- DNA probe—(BD, Affirm VP III) for *Trichomonas vaginalis*, *Candida albicans*, and *Gardnerella vaginalis* is available. Sensitivity, specificity, and clinical utility are higher than wet mount but lower than culture.
- Rapid antigen test—(OSOM TV, Genzyme Diagnostics, Inc.) for *T. vaginalis* is an available point-of-care test. Sensitivity higher than wet mount, but similar to culture.
- Nucleic acid amplification tests (NAAT)—The *Trichomonas* APTIMA test (GenProbe) is approved by the U.S. FDA for the diagnosis of vaginal trichomoniasis. This test is highly sensitive and specific and can be performed on self-collected or clinician-collected vaginal swab, urine, or liquid endocervical cytology media. This test is considerably more sensitive than culture.
- Other commercially available diagnostic tests
 - PIP activity (Proline aminopeptidase) for BV
 - BV-Blue® (Genzyme Diagnostics, Inc.) detects sialidase produced by *G. vaginalis* and other species for BV
 - PCR assay—(Amplicor, Roche Diagnostic Corp.) for *N. gonorrhoeae*, *C. trachomatis* and *T. vaginalis*

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Vaginitis Differentiation

Table—useful criteria for diagnosing vaginitis

Vaginitis: Differentiating BV, Candidiasis, and Trichomoniasis

	Normal	Bacterial Vaginosis	Candidiasis	Trichomoniasis
Symptoms presentation		Odor, discharge, itch	Itch, discomfort, dysuria, thick discharge	Itch, discharge, ~70% asymptomatic
Vaginal discharge	Clear to white	Homogenous, adherent, thin, milky white; malodorous “foul fishy”	Thick, clumpy, white “cottage cheese”	Frothy, gray or yellow-green; malodorous
Clinical findings			Inflammation and erythema	Cervical petechiae “strawberry cervix”
Vaginal pH	3.8–4.2	> 4.5	Usually ≤ 4.5	> 4.5
KOH “whiff” test	Negative	Positive	Negative	Often positive
NaCl wet mount	Lacto-bacilli	Clue cells (≥20%), no/few WBCs	Few to many WBCs	Motile flagellated protozoa, many WBCs
KOH wet mount			Pseudohyphae or spores if non- <i>albicans</i> species	

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Vaginitis—Bacterial Vaginosis (BV)

[Slide 12]

Learning Objectives

Upon completion of this module, the learner will be able to

- Describe the epidemiology of bacterial vaginosis in the U.S.
- Describe the pathogenesis of bacterial vaginosis
- Describe the clinical manifestations of bacterial vaginosis
- Identify common methods used in the diagnosis of bacterial vaginosis
- List CDC-recommended treatment regimens for bacterial vaginosis
- Describe patient follow-up and partner management for patients with bacterial vaginosis
- Summarize appropriate prevention counseling messages for patients with bacterial vaginosis

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Lessons

- I. Epidemiology: Disease in the U.S.
- II. Pathogenesis
- III. Clinical manifestations
- IV. Diagnosis
- V. Patient management
- VI. Prevention

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Lesson I: Epidemiology: Disease in the U.S.

[Slide 15]

Epidemiology

- Most common cause of vaginitis
 - Occurrence of BV may be associated with a variety of sexual behaviors, but BV is not considered an STD.
- Widely distributed
 - National data show that the prevalence is 29%, but varies by population: 5%–25% in college students, 12%–61% in STD patients.

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Epidemiology (continued)

- BV linked to premature rupture of membranes, premature delivery, and low birth-weight delivery; increased risk for acquisition of HIV, *N. gonorrhoeae*, *C. trachomatis*, and HSV-2; development of PID and post-operation infections after gynecological procedures and recurrence of BV.

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Risk Factors

More common in African-American women, women who douche, women with a new sex partner, women with more than two sex partners in previous six months, lack of barrier protection and women who lack peroxide (H₂O₂)-producing lactobacilli in their vaginal flora. High concordance identified in female same-sex partnerships.

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Transmission

Acquisition—currently not considered a sexually transmitted disease, but it appears to be related to sexual activity.

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Lesson II: Pathogenesis

[Slide 20]

Microbiology

- Overgrowth of bacteria species normally present in vagina, but at low levels, such as *Haemophilus*, *Gardnerella*, *Bacteroides*, *Mycoplasma hominis*, *Mobiluncus*, *Peptostreptococcus*, *Ureaplasma*
- BV correlates with the decrease or absence of protective lactobacilli.
 - Lactobacilli produce lactic acid through metabolism of glucose/glycogen.
 - Lactic acid keeps the vaginal pH acidic which inhibits growth of other bacterial species.
 - When lactobacilli are lacking, overgrowth of bacteria occurs.
 - Hydrogen peroxide-producing *Lactobacillus* spp. helps to maintain a low pH, which may directly inhibit some organisms.
 - Loss of protective lactobacilli may lead to BV.

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H₂O₂-Producing Lactobacilli

- All lactobacilli produce lactic acid.
- Some species also produce hydrogen peroxide.
- Hydrogen peroxide is a potent natural microbicide.
- Present in 42%–74% of females. The prevalence of BV in women who have H₂O₂ producing lactobacilli is 4%.
- In vitro, H₂O₂ is toxic to viruses such as HIV, as well as to bacteria.

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Lesson III: Clinical Manifestations

[Slide 23]

Clinical Presentation and Symptoms

- BV can be asymptomatic in about 50% of women. If symptomatic, most women will report malodorous (fishy smelling) vaginal discharge which occurs most commonly after vaginal intercourse and after completion of menses. Vaginal pruritis may also be present.
- Symptoms may remit spontaneously.

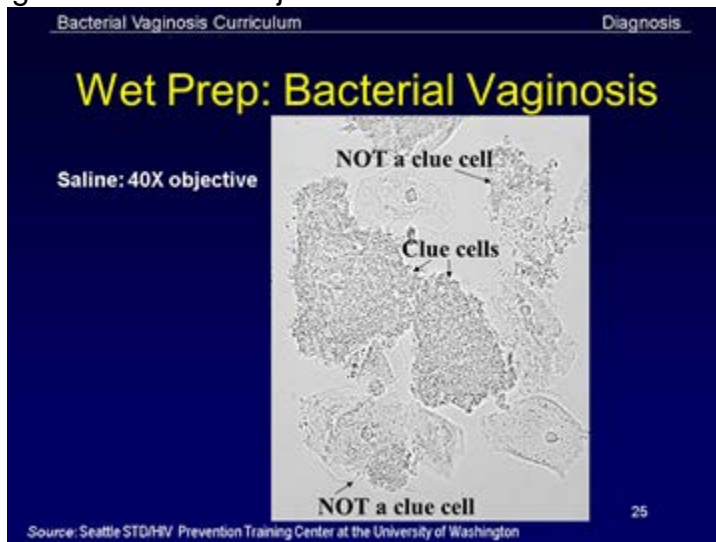
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Lesson IV: Diagnosis

[Slide 25]

Wet Prep: Bacterial Vaginosis

Image: Saline: 40x objective. Note clue cells.



[Slide 26]

BV Diagnosis: Amsel Criteria

Bacterial vaginosis can be diagnosed using the following Amsel criteria. The presence of three of the four criteria is diagnostic:

- Vaginal pH >4.5 (most sensitive but least specific)
- Presence of "clue cells" on wet mount examination (bacterial clumping upon the borders of epithelial cells). Clue cells should constitute at least 20% of all epithelial cells (an occasional clue cell does not fulfill this criterion).
- Positive amine or "whiff" test (liberation of biologic amines with or without the addition of 10% KOH)
- Homogeneous, nonviscous, milky-white discharge adherent to the vaginal walls

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Other Diagnostic Tools

- Gold standard for diagnosis of BV is vaginal Gram stain (Nugent or Speigel criteria). A normal Gram stain would show lactobacillus (long Gram-positive rods) only or lactobacillus with Gardnerella. When a more mixed flora is present (Gram-positive cocci, small Gram-negative rods, curved Gram-variable rods) and lactobacillus absent, or present in low numbers, the smear would be interpreted as consistent with BV.
- Culture is not recommended.
- DNA probe—Affirm™ V.P. III, can detect high levels of *G. vaginalis*.
- Other diagnostic modalities include PIP activity and sialidase tests (BV Blue). These tests detect abnormal pH, high levels of trimethylamine, or high levels of proline aminopeptidase.

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Lesson V: Patient Management

[Slide 29]

Treatment

- CDC-recommended regimens (nonpregnant patients)
 - Metronidazole 500 mg orally twice a day for 7 days, or
 - Metronidazole gel 0.75% 1 applicator-full (5 g) intravaginally once or twice daily for 5 days [If once daily, administer at bedtime], or
 - Clindamycin cream 2% 1 applicator-full (5 g) intravaginally at bedtime for 7 days

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Treatment (continued)

- Alternative regimens (nonpregnant patients)—
 - Tinidazole 2 g orally once daily for 2 days, or
 - Tinidazole 1g orally once daily for 5 days, or
 - Clindamycin 300 mg orally twice a day for 7 days, or
 - Clindamycin ovules 100 g intravaginally at bedtime for 3 days
- Multiple recurrences
 - Twice weekly metronidazole gel for 4–6 months may reduce recurrences
 - Oral nitroimidazole followed by intravaginal boric acid and suppressive metronidazole gel

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Treatment in Pregnancy

- All pregnant women with symptomatic disease should be treated with one of the following recommended regimens.
 - Metronidazole 500 mg twice a day for 7 days, or
 - Metronidazole 250 mg three times a day for 7 days, or
 - Clindamycin 300 mg orally twice a day for 7 days
 - Treatment early in pregnancy may actually be important in preventing adverse outcome.

- Insufficient evidence to assess the impact of screening for BV in asymptomatic pregnant women at high risk (those who have previously delivered a premature infant)

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Screening and Treatment

- Treatment is recommended for women with symptoms.
- Therapy is not recommended for male or female sex partners of women with BV.
- Treatment of asymptomatic patients with BV who are to undergo surgical abortion or hysterectomy can be considered. However, data are insufficient to recommend treatment of asymptomatic patients prior to procedures other than surgical abortion or hysterectomy.

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Treatments Not Recommended

Drugs not recommended for the treatment of BV include

- Ampicillin
- Erythromycin
- Iodine
- Dienestrol cream
- Tetracycline/doxycycline
- Triple sulfa, and
- Ciprofloxacin

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Recurrence

- The recurrence rate is 20% to 40% after one month.
- Recurrence may be a result of persistence of BV-associated organisms and a failure of lactobacillus flora to recolonize.
- Data do not support yogurt therapy or exogenous oral lactobacillus treatment.
- Under study: vaginal suppositories containing human lactobacillus strains
- Twice weekly metronidazole gel for 4–6 months may reduce recurrences.
- After multiple occurrences, limited data suggest that oral nitroimidazole followed by intravaginal boric acid and suppressive metronidazole gel might be an option in women with recurrent BV. (cite reference)

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Lesson VI: Prevention

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Partner Management

- Relapse or recurrence is not affected by treatment of sex partner(s).
- Routine treatment of sex partners is not recommended.

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Patient Counseling and Education

Counselor should cover the nature of the disease, transmission issues, and risk reduction.

- Nature of the disease
 - Normal versus abnormal discharge
 - Malodor symptomatology
 - Other signs and symptoms of BV
- Transmission issues
 - High concordance in female same sex partnerships
 - Association with sexual activity
- Risk reduction
 - Consistent and correct condom use
 - Avoid douching
 - Limit number of sex partners

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Vaginitis—Vulvovaginal Candidiasis (VVC)

[Slide 39]

Learning Objectives

Upon completion of this content, the learner will be able to

- Describe the epidemiology of candidiasis in the U.S.
- Describe the pathogenesis of *C. albicans*.
- Describe the clinical manifestations of candidiasis.
- Identify common methods used in the diagnosis of candidiasis.
- List CDC-recommended treatment regimens for candidiasis.
- Describe patient follow-up and partner management for candidiasis.
- Summarize appropriate prevention counseling messages for patients with candidiasis.

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Lessons

- I. Epidemiology: Disease in the U.S.
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Lesson I: Epidemiology: Disease in the U.S.

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VVC Epidemiology

- Commonly called “yeast infection.” Affects most females at least once during lifetime. Second most common cause of vaginitis after bacterial vaginosis.
- Most cases of candidiasis are caused by *C. albicans* (85%–90%). *C. glabrata* and *C. parapsilosis* are responsible for 5%–10% of cases.
- Diagnosis and therapy costs estimated at \$1 billion per year.
- Frequent infections may be linked to diabetes, corticosteroids, repeated courses of antibiotics, pregnancy, or HIV disease, although most patients have no risk factors.

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Transmission

Candida species are normal flora of skin and vagina and are not considered to be sexually transmitted pathogens.

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Lesson II: Pathogenesis

[Slide 45]

Microbiology

- Candida species are normal flora of skin and vagina. Candida species may be isolated from 20% of asymptomatic healthy women.
- VVC is caused by overgrowth of *Candida albicans* or non-albicans species.
- Yeast grows as oval budding yeast cells and as chains of cells (pseudohyphae).
- Symptomatic clinical infection occurs in the setting of excessive growth of yeast, which is usually kept in check by normal vaginal bacteria.
- Disruption of normal vaginal ecology or host immunity can predispose to vaginal yeast infections (e.g., pregnancy, diabetes, HIV infection, or, in some women, antibiotic use).

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Lesson III: Clinical Manifestations

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Clinical Presentation and Symptoms

- Vulvar pruritis is the most common symptom.
- Thick, white, curdy ("cottage cheese-like") vaginal discharge
- Erythema, irritation, occasional erythematous "satellite" lesion
- External dysuria and dyspareunia

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Vulvovaginal Candidiasis

Image



[Slide 49]

Lesson IV: Candidiasis Diagnosis

[Slide 50]

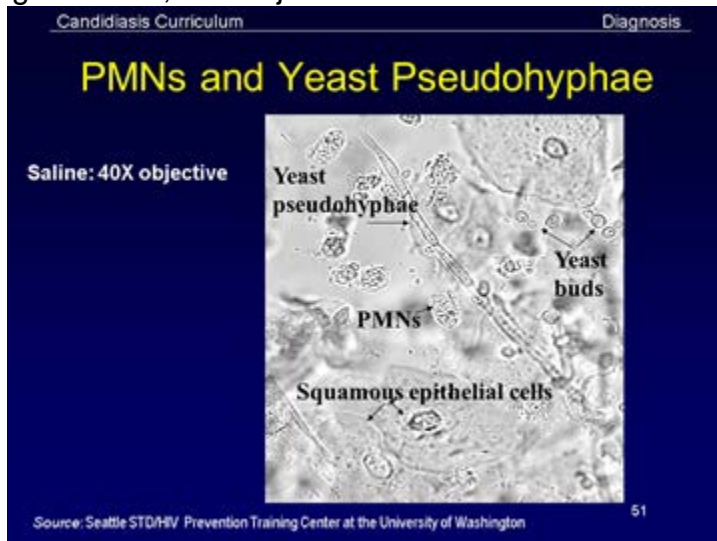
Diagnosis

- History, clinical presentation, and symptoms
- Visualization of pseudohyphae (mycelia) and/or budding yeast (conidia) on 10% KOH wet prep examination (preferred), saline wet mount, or Gram stain
- pH normal (4.0 to 4.5). If pH is abnormally high (≥ 4.5), consider concurrent bacterial vaginosis (BV) or trichomoniasis.
- Cultures not useful for routine diagnosis, since positive cultures may be detecting colonization rather than clinically significant infections. Cultures may be useful to detect non-albicans species or resistant organisms in women with recurrent disease.
- DNA probe is available but expensive.

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PMNs and Yeast Pseudohyphae

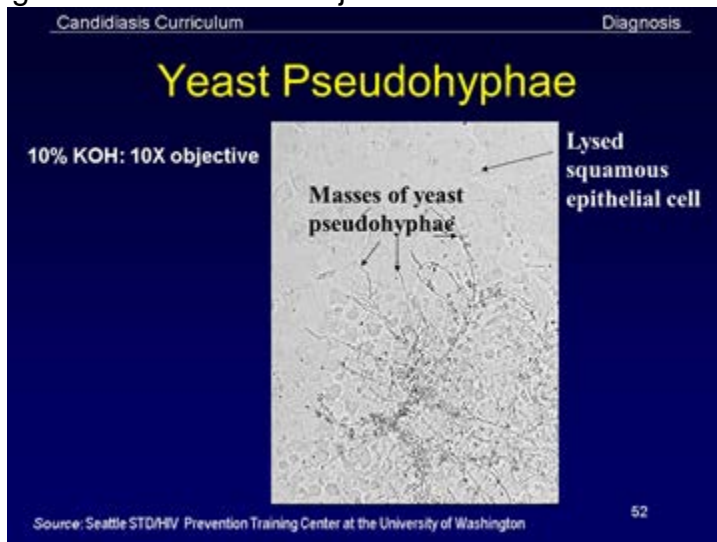
Image: Saline, 40x objective



[Slide 52]

Yeast Pseudohyphae

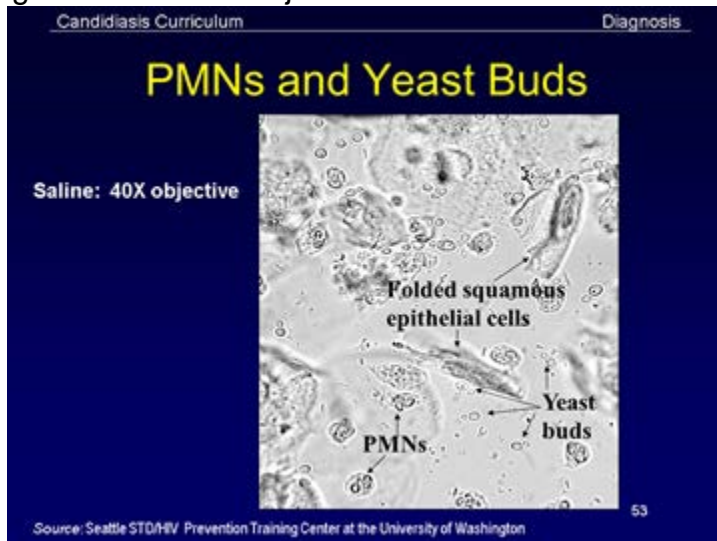
Image: 10% KOH: 10x objective.



[Slide 53]

PMNs and Yeast Buds

Image: Saline: 40x objective



[Slide 54]

Lesson V: Patient Management

[Slide 55]

Classification of VVC

Uncomplicated or Complicated

- Uncomplicated VVC includes sporadic or infrequent vulvovaginal candidiasis, mild-to-moderate vulvovaginal candidiasis, or vulvovaginal candidiasis in nonimmunocompromised women.
- Complicated VVC includes recurrent vulvovaginal candidiasis (RVVC), severe vulvovaginal candidiasis, nonalbicans candidiasis, or vulvovaginal candidiasis in women with uncontrolled diabetes, debilitation, or immunosuppression.

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Uncomplicated VVC

- Mild to moderate signs and symptoms
- Sporadic, nonrecurrent disease in a normal host with normally susceptible *C. albicans*
- 75% of women have at least one lifetime episode
- Responds to all azole treatment regimens including short (three-day) and single-dose oral and vaginal therapy

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CDC-Recommended Treatment Regimens for Uncomplicated VVC

- Over-the-Counter Intravaginal Agents
 - Butoconazole 2% cream, 5 g intravaginally for 3 days or
 - Clotrimazole 1% cream 5 g intravaginally for 7–14 days or

- Clotrimazole 2% cream 5 g intravaginally for 3 days or
- Miconazole 2% cream 5 g intravaginally for 7 days or
- Miconazole 4% cream 5 g intravaginally for 3 days or
- Miconazole 100 mg vaginal suppository, 1 suppository for 7 days or
- Miconazole 200 mg vaginal suppository, 1 suppository for 3 days or
- Miconazole 1,200 mg vaginal suppository, 1 suppository for 1 day or
- Tioconazole 6.5% ointment 5 g intravaginally in a single application
- Prescription Intravaginal Agents
 - Butoconazole 2% cream (single dose bioadhesive product), 5 g intravaginally for 1 day or
 - Nystatin 100,000-U vaginal tablet, 1 tablet for 14 days or
 - Terconazole 0.4% cream 5 g intravaginally for 7 days or
 - Terconazole 0.8% cream 5 g intravaginally for 3 days or
 - Terconazole 80 mg vaginal suppository, 1 suppository for 3 days
- Prescription Oral agent
 - Fluconazole 150 mg oral tablet, 1 tablet in a single dose

NOTE: The creams and suppositories in these regimens are oil-based and may weaken latex condoms and diaphragms. Refer to condom product labeling for further information.

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Complicated VVC

Approximately 10% to 20% of women with candidiasis will have complicated VVC. VVC is considered complicated when the following exists.

- Recurrent VVC (RVVC)—four or more episodes in one year, consider getting culture to identify species and confirm diagnosis.
- Severe VVC—Extensive vulvar erythema, edema, excoriation or fissure formation, long course recommended.
- Nonalbicans species—Requires longer duration of treatment (10–15 days) with topical azoles.
- Compromised host—Women with diabetes, immunosuppression, or HIV

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Complicated VVC Treatment

- Recurrent VVC (RVVC)
 - Seven to fourteen days of topical therapy, or
 - 100 mg, 150 mg, or 200 mg oral dose of fluconazole every third day for a total of 3 doses (days 1, 4, and 7)
 - While some women with RVVC have risk factors, most women do not. Recurrent disease may be more likely due to nonalbicans species.
 - After an initial intensive regimen of 7–14 days, a maintenance regimen for at least 6 months is recommended.
 - Maintenance regimens
 - Fluconazole 100 mg, 150 mg or
 - Fluconazole 200 mg orally weekly for 6 months or

- Clotrimazole 200 mg twice a week topically or
 - Clotrimazole 500 mg dose vaginal suppositories once weekly
- RVVC should be confirmed by culture before initiating maintenance therapy. VVC diagnosis should also be periodically reconfirmed, and the presence of other contributory causes (new trichomoniasis or BV) assessed.
- Patients with RVVC who are receiving treatment should receive regular follow-up to monitor the effectiveness of therapy and the occurrence of drug side effects.
- Drug interactions with oral treatment may occur.
- Severe VVC
 - Seven to fourteen days of topical therapy, or
 - Fluconazole 150 mg oral dose repeated in 72 hours
 - In cases associated with severe vulvitis and intense pruritis, topical applications of low-potency corticosteroid cream or nystatin cream may be beneficial.

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Complicated VVC Treatment (continued)

- Nonalbicans VVC
 - Optimal treatment unknown
 - Seven to fourteen days with a nonfluconazole therapy (oral or topical)
 - 600 mg boric acid in gelatin capsule vaginally once a day for 14 days for recurrences
- VVC in a compromised host
 - Seven to fourteen days of topical therapy
- VVC in pregnancy
 - Fluconazole is contraindicated.
 - Seven day topical agents are recommended.

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Lesson VI: Prevention

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Partner Management

- VVC is not usually acquired through sexual intercourse; treatment of sex partners is not recommended, but may be considered in women who have recurrent infection.
- A minority of male sex partners may have balanitis, characterized by erythematous areas on the glans penis in conjunction with pruritis or irritation.
- Male sex partners may benefit from treatment with topical antifungal agents to relieve symptoms.

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Patient Counseling and Education

Should cover the nature of the disease, transmission issues, and risk reduction

- Nature of the disease
 - Normal versus abnormal vaginal discharge
 - Signs and symptoms of candidiasis
 - Maintain normal vaginal flora

- Control of predisposing conditions
- Transmission
 - Not sexually transmitted
- Risk reduction
 - Avoid douching
 - Avoid unnecessary antibiotic use
 - Contact health provider if symptoms persist or recur within two months.
 - Complete recommended course of treatment.

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Vaginitis—Trichomoniasis (*Trichomonas vaginalis*)

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Learning Objectives

Upon completion of this content, the learner will be able to

- Describe the epidemiology of trichomoniasis in the United States.
- Describe the pathogenesis of *Trichomonas vaginalis*.
- Describe the clinical manifestations of trichomoniasis.
- Identify common methods used in the diagnosis of trichomoniasis.
- List CDC-recommended treatment regimens for trichomoniasis.
- Describe patient follow-up and partner management for patients with trichomoniasis.
- Describe appropriate prevention counseling messages for patients with trichomoniasis.

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Lessons

- I. Epidemiology
- II. Pathogenesis
- III. Clinical manifestations
- IV. Diagnosis
- V. Patient management
- VI. Prevention

[Slide 67]

Lesson I: Epidemiology: Disease in the U.S.

[Slide 68]

Incidence and Prevalence

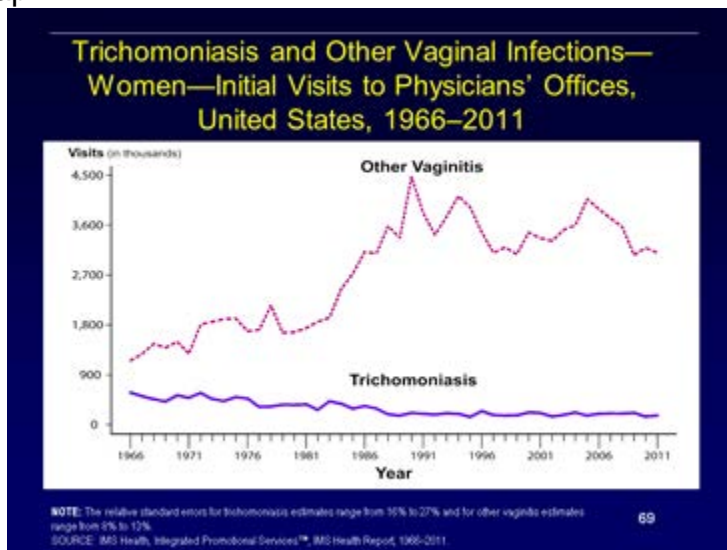
- Most prevalent nonviral STI
- Estimated one million cases annually in the U.S. at a medical cost of \$24 million
- Approximately 3% prevalence in the general female population
 - 1.3% in non-Hispanic white women
 - 1.8% in Mexican American women
 - 13.3% in non-Hispanic black women
- Prevalence increases with age among women
- 40%–60% prevalence in female prison inmates and commercial sex workers

- 18%–50% prevalence in females with vaginal complaints
- Approximately 70–85% of women are asymptomatic
- Not routinely tested in men. A 17% prevalence rate was seen in males attending an STD clinic in one city.

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Trichomoniasis and Other Vaginal Infections—Women—Initial Visits to Physicians' Offices: United States, 1966–2011

Graph—



[Slide 70]

Risk Factors

- Multiple sex partners
- Low socioeconomic status
- History of STDs
- Lack of condom use

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Transmission

- Almost always sexually transmitted; fomite transmission is rare.
- *T. vaginalis* may persist from months to years in epithelial crypts and periglandular areas. Distinguishing persistent, subclinical infection from remote sexual acquisition is not always possible.
- Females and males may be asymptomatic.
- Transmission between female sex partners has been documented.

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Lesson II: Pathogenesis

[Slide 73]

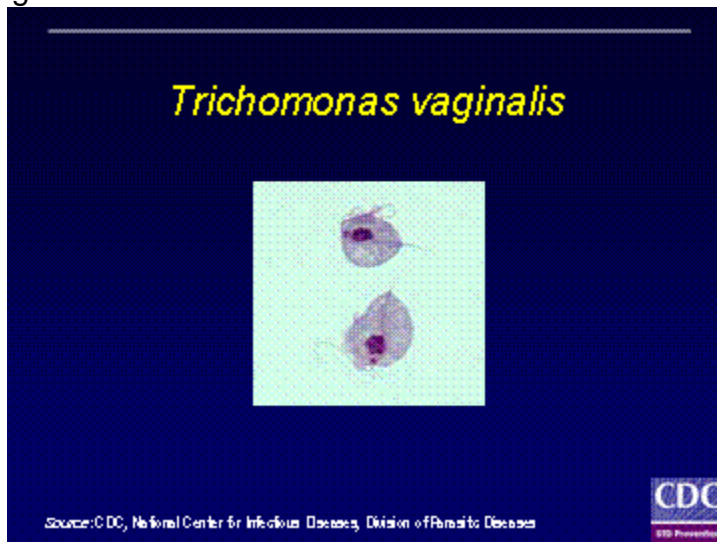
Microbiology

- Etiologic agent: *Trichomonas vaginalis*—a single-celled, flagellated, anaerobic protozoan parasite
 - The only known protozoan that infects the genital tract.
 - *T. vaginalis* has four free flagellae and one flagella embedded in an undulating membrane. The flagellae are responsible for the jerky motility of *T. vaginalis*.
- Associations with
 - Preterm rupture of membranes, preterm delivery, pelvic inflammatory disease
 - Increased risk of HIV acquisition and transmission

[Slide 74]

Trichomonas vaginalis

Image



[Slide 75]

Lesson III: Clinical Manifestations

[Slide 76]

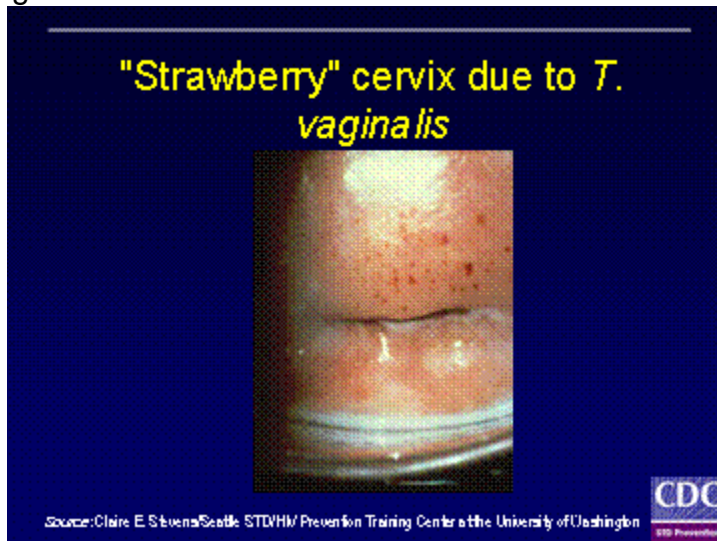
Clinical Presentation and Symptoms in Women

- Asymptomatic approximately 70% of the time
- Vaginitis
 - Frothy gray or yellow-green vaginal discharge
 - Pruritus
 - Cervical petechiae ("strawberry cervix")—classic presentation, but occurs in <2% of cases
- May also infect Skene's glands and urethra, where the organisms may not be susceptible to topical therapy.
- Trichomoniasis has been associated with increased shedding of HIV in HIV-infected women.

[Slide 77]

“Strawberry cervix” due to *T. vaginalis*

Image



[Slide 78]

Clinical Presentation and Symptoms in Men

- Usually asymptomatic
- May cause 11%–13% of infected males to present with nongonococcal urethritis (NGU).

[Slide 79]

Lesson IV: Diagnosis

[Slides 80]

Diagnosis in Females

In the clinical setting the diagnosis of trichomoniasis is made using the following diagnostic methods.

- Motile trichomonads seen in saline wet mount (most common mode of diagnosis). Compared to culture, sensitivity varies from 42%–70% depending upon the experience of the microscopist and specimen collection technique. White blood cells are frequently seen. Microscopy should be performed as soon as possible after obtaining the specimen. Trichomonads, especially if the specimen is old, may closely resemble white blood cells. White blood cells can also be confused with trichomonads, so motility is required for positive identification.
- Vaginal pH >4.5 is often present.
- Culture (Diamond's media or InPouch TV) has been the “gold standard.”
- Pap smear sensitivity using traditional cytology is poor, but use of a liquid-based testing has demonstrated enhanced sensitivity and can provide reliable results.
- DNA probe has sensitivity higher than wet prep, but is also more expensive and not widely available.
- Rapid test (antigen detection test, OSOM) has sensitivity higher than wet prep.
- Recently, the Trichomonas APTIMA Nucleic acid amplification test (NAAT)

(GenProbe) was approved by the U.S. FDA for the diagnosis of vaginal trichomoniasis. This test is highly sensitive and specific and can be performed on self-collected or clinician-collected vaginal swab, urine or liquid endocervical cytology media. This test is considerably more sensitive than culture.

[Slide 81]

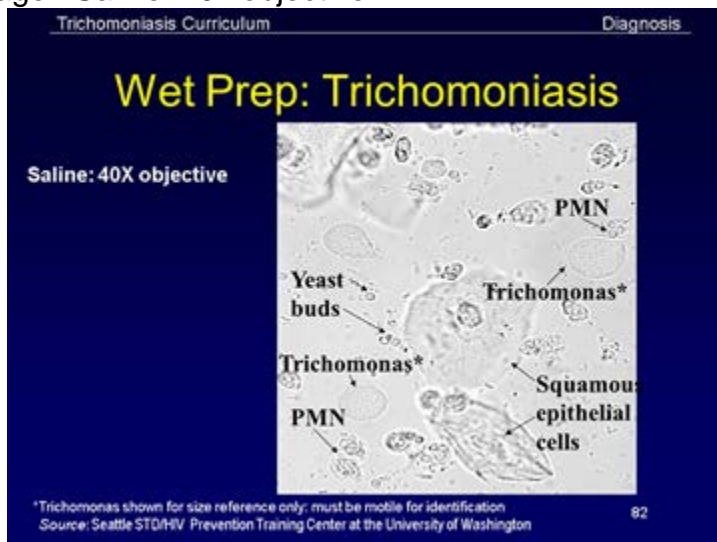
Diagnosis in Males

- Culture testing of urethral swab, urine, or semen is one diagnostic option.
- NAATs have superior sensitivity for *T. vaginalis* diagnosis in men, and the GenProbe APTIMA test has been approved for this purpose.
- Sex partners of women diagnosed with *T. vaginalis* should also be treated (regardless of initial testing).

[Slide 82]

Wet Prep: Trichomoniasis

Image: Saline: 40x objective



[Slide 83]

Lesson V: Patient Management

[Slide 84]

Treatment

- CDC-recommended regimen
- Metronidazole 2 g orally in a single dose or Tinidazole 2 g orally in a single dose
- Alternate regimen: Metronidazole 500 mg twice a day for 7 days

[Slide 85]

Pregnancy

CDC-recommended regimen

- Metronidazole 2 g orally in a single dose
- All symptomatic pregnant women should be treated, regardless of pregnancy stage.

[Slide 86]

Treatment Failure and Allergy

- A common reason for treatment failure is reinfection. Therefore, it is critical to assure treatment of all sex partners at the same time.
- If treatment failure occurs with metronidazole 2 g orally single dose, the patient and partner(s) can be treated with metronidazole 500 mg orally twice daily for 7 days or tinidazole 2 g orally single dose.
- For patients experiencing failure of either of these regimens, consider retreatment with tinidazole or metronidazole 2 g orally once a day for 5 days.
- If repeated treatment failures occur on higher dose regimen and all potential partners have been treated, contact the Division of STD Prevention at CDC for metronidazole-susceptibility testing (telephone: 404-718-4141 website: www.cdc.gov/std/).
- Metronidazole has a 90%–95% cure rate and tinidazole has an 86–100% cure rate. Metronidazole gel (intravaginal) is less efficacious for trichomoniasis and is not recommended for treatment.
- Test for other STDs.
- Patients who are allergic to metronidazole can be managed by a desensitization protocol. Topical therapy with drugs other than nitroimidazoles can be attempted, but cure rates are low (<50%).

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Lesson VI: Prevention

[Slide 88]

Partner Management

- All sex partners should be treated.
- All patients with trichomoniasis should be treated (whether symptomatic or asymptomatic).
- Patients should be instructed to avoid sex until they and their sex partners are cured. In the absence of a microbiologic test of cure, this means when therapy has been completed and patient and partner(s) are asymptomatic. This usually takes about 7 days.

[Slide 89]

Patient Counseling and Education

- Nature of the disease
 - Education regarding normal versus abnormal discharge
 - Both men and women can be asymptomatic. In women, *T. vaginalis* may persist for months or years in epithelial crypts and periglandular areas.
 - *T. vaginalis* might be associated with adverse outcomes of pregnancy and PID.
 - Douching may worsen vaginal discharge.
 - Alcohol consumption is contraindicated with metronidazole.
- Transmission issues
 - Trichomoniasis is almost always sexually transmitted. Fomite transmission is rare.

- Sex partners should be treated.
- Patients should abstain from intercourse until they and their sex partners are cured.
- Might be associated with increased susceptibility to HIV acquisition.

[Slide 90]

Risk Reduction

- The clinician should
 - Assess client's behavior-change potential.
 - Develop individualized risk-reduction plans with the patient.
 - Discuss prevention strategies, such as abstinence, monogamy, use of condoms and limiting the number of sex partners. Latex condoms, when used consistently and correctly, can reduce the risk of transmission of the *T. vaginalis* parasite.

[Slide 91]
Case Study

[Slide 92]
History

Tanya Walters is a 24-year-old single female who presented at her HMO with complaints of a smelly, yellow vaginal discharge and slight dysuria for one week.

- Denies vulvar itching, pelvic pain, or fever
- Has had 2 sex partners over the past 6 months—did not use condoms with these partners—on oral contraceptives for birth control
- No history of sexually transmitted diseases, except for trichomoniasis one year ago
- Last check-up one year ago

[Slide 93]
Physical Exam

- Vital signs: blood pressure 112/78, pulse 72, respiration 15, temperature 37.3° C
- Cooperative, good historian
- Chest, heart, breast, musculoskeletal, and abdominal exams within normal limits
- No flank pain on percussion
- Normal external genitalia with a few excoriations near the introitus, but no other lesions
- Speculum exam reveals a moderate amount of frothy, yellowish, malodorous discharge, without visible cervical mucopus or easily induced cervical bleeding
- Bimanual examination was normal without uterine or adnexal tenderness

[Slide 94]
Questions

1. What is your differential diagnosis based on history and physical examination?

- Vaginitis—Vaginitis caused by trichomoniasis, bacterial vaginosis, or vulvovaginal candidiasis is usually characterized by a vaginal discharge, vulvar itching or irritation, and a vaginal odor.
- Chlamydia—Chlamydia is usually asymptomatic and cannot be diagnosed clinically. With the history of unprotected sex and the epidemiology of chlamydia, it must be considered.
- Gonorrhea—Gonorrhea can be asymptomatic and cannot be diagnosed clinically. With the history of unprotected sex and the epidemiology of gonorrhea, it cannot be ruled out.

2. Based on the differential diagnosis of vaginitis, what is the etiology?

Unknown at this time. In addition to a physical examination and visual inspection of the vagina, an appropriate evaluation of vaginitis requires a collection of a specimen of the discharge for examination under a microscope.

Possible etiologic agents include the following. However, none of them can be confirmed without examination of the discharge specimen.

- *Trichomonas vaginalis*, which should be suspected in the presence of frothy gray or yellow-green vaginal discharge, pruritis, or cervical petechiae.
- *Candida albicans*, which should be suspected in the presence of thick, white, curdy (cottage cheese-like) vaginal discharge. Vulvar pruritis, erythema, irritation, and an occasional erythematous “satellite” lesion may occur. External dysuria is another common symptom of VVC.
- Bacterial vaginosis, which is associated with a malodorous vaginal discharge that is reported more commonly after sexual intercourse or menses.

3. Which laboratory tests should be offered or performed?

Appropriate responses include the following:

- Vaginal saline wet mount—Vaginal saline wet mount could reveal trichomonads and clue cells.
- KOH wet mount—The KOH wet mount could reveal budding yeast or pseudohyphae.
- “Whiff” test—The “whiff” test might elicit the fishy odor of amines.
- Vaginal fluid pH—Elevated in BV and trichomoniasis.
- Chlamydia—A chlamydia test is appropriate because of the high prevalence of chlamydial infection in young women and its asymptomatic nature. CDC recommends that all sexually active women age 25 and under be screened for chlamydia on an annual basis, so testing this woman depends on when she was last screened and her risk assessment for recent STD acquisition.
- Testing for other STDs—Depending on prevalence rates and the patient’s behavioral risk factors, one may also consider screening for gonorrhea, syphilis, hepatitis B and C, and offering HIV testing. HPV vaccine is licensed for use in women through age 26, and routine pap screening can reveal the presence of HPV-related cervical disease. If NAAT or another assay more sensitive than wet mount for trichomoniasis is available, that should be considered.
- Counseling and testing for HIV—The history of risky sexual behavior is an indication for offering HIV testing.

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Laboratory Results

- Vaginal pH—6.0
- Saline wet mount of vaginal secretions—numerous motile trichomonads and no clue cells
- KOH wet mount—negative for budding yeast and pseudohyphae

4. What may one reasonably conclude about Tanya’s diagnosis?

Trichomoniasis has been diagnosed and candida has been reasonably ruled out. KOH prep will only detect fungal elements on average in 50%–85% of women whose vaginitis turns out to be yeast. The normal vaginal pH is 3.8–4.2.

5. What is the appropriate CDC-recommended first-line treatment for this patient?

Metronidazole 2 g orally in a single dose

[Slide 96]

Partner Management

Tanya has had two sex partners within the past year:

Jamie

Last sexual contact: two days ago

First sexual contact: two months ago

Frequency, exposure type: Twice a week, vaginal sex

Calvin

Last sexual contact: six months ago

First sexual contact: seven months ago

Frequency, exposure type: three times a week, vaginal and oral sex

6. How should Jamie and Calvin be managed?

Ensuring treatment of male partners results in relief of symptoms, microbiologic cure, and reduction of transmission. Trichomoniasis may be asymptomatic in both men and women.

Jamie should be treated, and Tanya and Jamie should avoid sex until both are cured (therapy is complete and they are asymptomatic).

Since Calvin and Tanya have not had sex in 6 months, Calvin is probably not related to this infection. However, trichomoniasis can last for months or years, so there is no way to know for sure how long Tanya has been infected. Especially since testing for males is not routinely done, it would be cautious to offer treatment to Calvin too.

[Slide 97]

Follow-Up

Tanya was prescribed metronidazole 2 g orally, and she was instructed to abstain from sexual intercourse until her current partner was treated.

She returned to clinic two weeks later. She reported taking her medication, but still had persistent vaginal discharge that had not subsided with treatment. She reported abstinence since her clinic visit, and her partner had moved out of the area. Her tests for other STDs (including chlamydia and gonorrhea) were negative.

The vaginal wet mount again revealed motile trichomonads.

7. What is the appropriate therapy for Tanya now?

Metronidazole 500 mg twice a day for 7 days or tinidazole 2 g single dose. If treatment failure occurs with one recommended regimen, the patient should be retreated with the other regimen.

If treatment failure occurs after one treatment attempt with each of the two regimens, the patient should be retreated with tinidazole or metronidazole 2 g once a day 5 days. For patients failing this regimen, treatment with tinidazole or metronidazole at 2 g orally for 5 days should be considered. If these therapies are not effective, further management should be discussed with a specialist.

8. What are the appropriate prevention and counseling messages for Tanya?
 - Patients should be instructed to avoid sex until they and their sex partners are treated and cured.
 - In the absence of a microbiologic test of cure, "cured" is when therapy has been completed and patient and partner(s) are asymptomatic.
 - Clarify that trichomoniasis is almost always sexually transmitted, and fomite transmission is rare.
 - Discuss individual risk reduction and prevention strategies, including abstinence, monogamy, and condoms.
 - Inform the patient that latex condoms can reduce the risk of transmission of trichomoniasis when used consistently and correctly.
 - Alcohol should be avoided when metronidazole is used for treatment.
 - Hormonal contraceptives offer no protection from STDs and HIV infection.
 - Offer HIV counseling and testing.

TEST QUESTIONS

1. Which of the following statements is true about the vaginal ecosystem?
 - a) The normal vaginal flora is made up mostly of *Gardnerella*.
 - b) Normal vaginal discharge is colorless, odorless, and has a low viscosity.
 - c) Lactobacilli convert glucose to ascorbic acid.
 - d) **Lactobacilli may produce hydrogen peroxide that inhibits bacterial growth.**
2. Which of the following types of vaginitis occurs most frequently?
 - a) **Bacterial vaginosis**
 - b) Candidiasis
 - c) Trichomoniasis
 - d) Atrophic vaginitis
3. The diagnosis of vaginitis requires which of the following?
 - a) Patient history
 - b) Visual inspection of vaginal discharge
 - c) Collection of specimen of vaginal discharge for microscopic examination
 - d) **All of the above**
4. The normal vaginal pH is:
 - a) **3.8–4.2**
 - b) 5.0–6.0
 - c) 6.0–7.0
 - d) 2.5–3.5
5. Which of the following best describes the signs and symptoms of trichomoniasis in women?
 - a) Foul fishy odor, and thick clumpy white vaginal discharge
 - b) **Malodorous, frothy yellow-green vaginal discharge**
 - c) Dysuria, and thin milky-white vaginal discharge
 - d) None, the condition is asymptomatic in women.
6. Which of the following statements is **NOT** true about *Trichomonas vaginalis*?
 - a) **Fomite transmission is frequent.**
 - b) Sexual transmission is frequent.
 - c) Sex partners should be treated.
 - d) Patients are considered cured when patients and partners have been treated and are asymptomatic.
7. The most common method of trichomoniasis diagnosis is:
 - a) Vaginal pH
 - b) KOH “whiff” test
 - c) **Motile trichomonads seen on a saline wet mount**
 - d) Pap smear

8. The CDC-recommended treatment for trichomoniasis in nonpregnant women and in men is:
- a) Miconazole 100 mg vaginal suppository, 1 suppository for 7 days
 - b) Metronidazole 2 g orally as a one-time single dose**
 - c) Metronidazole 500 mg orally twice a day for 7 days
 - d) Clindamycin 300 mg orally twice a day for 7 days
9. The CDC recommends that pregnant women with trichomoniasis be treated with:
- a) Miconazole 100 mg vaginal suppository, 1 suppository for 7 days
 - b) Metronidazole 2 g orally as a one-time single dose**
 - c) Metronidazole 500 mg orally as twice a day for 7 days
 - d) Clindamycin 300 mg orally twice a day for 7 days
10. When should sex partners resume sexual intercourse after treatment for trichomoniasis?
- a) When they are both cured (when therapy has been completed and both are asymptomatic).**
 - b) Six months after both have completed therapy and the microbial tests are negative.
 - c) Partners may continue sexual practices as long as both are being treated and they use appropriate barrier methods.
11. Most cases of candidiasis are caused by:
- a) *C. albicans***
 - b) *C. glabrata*
 - c) *C. parapsilosis*
 - d) *T. vaginalis*
12. Which of the following best describes the signs and symptoms of candidiasis in women?
- a) External dysuria, pruritis, and thick, clumpy white vaginal discharge**
 - b) Foul fishy odor, frothy yellow-green vaginal discharge
 - c) Malodorous and thin milky-white vaginal discharge
 - d) None, the condition is asymptomatic in women.
13. The preferred method for candidiasis diagnosis is:
- a) KOH "whiff" test
 - b) Culture
 - c) KOH wet mount**
 - d) Pap smear
14. Which of the following is recommended for the treatment of uncomplicated vulvovaginal candidiasis?
- a) Any azole treatment regimen including single- or multiple-dose vaginally or single-dose orally**
 - b) Fluconazole 150 mg oral tablet repeated in 72 hours

- c) Itraconazole 100 mg daily for 3 days
 - d) Ketoconazole 100 mg daily for 3 days
15. Which of the following is true about treatment of male partners of women with candidiasis?
- a) A majority of male partners have balanitis and should be treated.
 - b) Treatment of male partners should be topical.
 - c) **Treatment of male partners is not recommended.**
 - d) Oral regimens are more effective in men.
16. Complicated VVC can be characterized by which of the following?
- a) Sporadic and non-recurrent
 - b) Nonimmunocompromised
 - c) **Recurrent**
 - d) Mild to moderate symptoms
17. What is the recommended treatment for uncomplicated vulvovaginal candidiasis in pregnancy?
- a) Fluconazole 150 mg in a single dose
 - b) **Topical agents only**
 - c) Itraconazole 100 mg in a single dose
 - d) Ketoconazole 100 mg in a single dose
18. Bacterial vaginosis may occur when there is a loss of protective:
- a) Antibodies
 - b) **Lactobacilli**
 - c) Mucus
 - d) Antigens
19. Which of the following best describes the signs and symptoms of bacterial vaginosis in women?
- a) External dysuria, discomfort, and thick clumpy white vaginal discharge
 - b) Malodorous, frothy yellow-green vaginal discharge
 - c) **Foul fishy odor and thin milky-white vaginal discharge**
 - d) None, the condition is asymptomatic in women.
20. Bacterial vaginosis has been associated with which of the following?
- a) PID
 - b) Premature rupture of membranes
 - c) Acquisition of HIV
 - d) **All of the above**
21. The following statements are true for which type of vaginitis: "Less than 25% of the time it is accompanied by a malodorous vaginal discharge; has a high recurrence rate; symptoms, if present, are more noticeable after sexual intercourse."
- a) Trichomoniasis

- b) **Bacterial vaginosis**
- c) Candidiasis
- d) Chlamydia

22. What is a recommended treatment for bacterial vaginosis in pregnant women?

- a) Metronidazole 2 g orally in a single dose
- b) Metronidazole 500 mg orally 2 times a day for 14 days
- c) Clindamycin ovules 100 mg intravaginally at bedtime for 3 days
- d) **Metronidazole 250 mg 3 times a day for 7 days**

23. What is the most likely vaginitis diagnosis based on the following criteria: pH 5.0; clue cells > 20% per HPF; KOH "whiff test" positive; and homogenous discharge?

- a) Trichomoniasis
- b) Candidiasis
- c) **Bacterial vaginosis**
- d) Chlamydia

24. The Amsel criteria used in the diagnosis of bacterial vaginosis includes all of the following except:

- a) Vaginal pH >4.5
- b) Presence of clue cells on wet mount
- c) Positive "whiff" test
- d) **Numerous WBCs**

25. Risk reduction messages for women with bacterial vaginosis would include which of the following?

- a) **Avoid douching**
- b) Treatment of all sexual partners
- c) Abstain from sex
- d) Annual screening of all women

RESOURCES

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Websites and Other Resources

1. CDC, Division of STD Prevention: www.cdc.gov/std
2. National Network of STD/HIV Prevention Training Centers: www.nnptc.org
3. 2010 CDC STD Treatment Guidelines (including e-book for iPad, iPhone, iPod Touch): www.cdc.gov/STD/treatment/2010/
4. STD information and referrals to STD clinics

CDC-INFO

1-800-CDC-INFO (800-232-4636)

TTY: 1-888-232-6348

In English, en Español

5. CDC National Prevention Information Network (NPIN): www.cdcpin.org
6. American Sexual Health Association (ASHA): www.ashastd.org